REMARKS

Claims 1-17, 19-20, and 23-37 are pending in the present application. Upon entry of the present amendments claims 4, 14, 23, 33, and 37 will be cancelled without prejudice as to the possible resubmission of these or similar claims in a continuing application. Claims 38 – 56 are newly added. Several of the claims stand objected to for informalities or rejected under 35 USC § 112, second paragraph, for being indefinite. The independent claims and some dependent claims stand rejected under 35 USC § 103(a) as being unpatentable over the combination of Ruffner in view of Hyunh. The remaining claims stand rejected over combinations of Ruffner, Hyunh, Trovato, Bottomley, Aman, McMurtry, and Verbeek.

Applicants have amended the independent claims to further define the claimed subject matter, so as to advance prosecution of the application towards allowance. In the following remarks, applicants explain that the subject matter of applicants' claims is patentable in view of the references of record. Should the examiner have questions or concerns, or if it would otherwise be helpful to advancing prosecution of the present application, the examiner is invited to call applicants' undersigned attorney at (206) 332-1384.

Claim Objections

The Office objects to the term "A robot system" as it appears in line 1 of claims 23-30. Official Action, at 2. Applicants have amended claims to recite 24-30, "The robot system." Applicants also herein cancel claim 23.

The Office objects to the term "A method" as it appears in line 1 of claims 33-35. Official Action, at 2. Applicants have amended claims 34-35 to recite, "The method." Applicants also herein cancel claim 33.

The Office objects to claim 37 for being a duplicate of claim 36. Official Action, at 2. Applicants herein cancel claim 37.

Applicants respectfully submit that these actions overcome the present claim objections.

Claim Rejections – 35 USC § 112

Claims 1, 5, 7, 8, 11, 12, 13, 16, 20, 24, 26, 27, 30, 31, and 35 stand rejected under 35 USC § 112, second paragraph, for being indefinite.

Regarding claims 1, 5, 7, 8, 12, 13, 16, 24, 26, 27, 31, and 35, the Office asserts that the phrase "such as" renders those claims indefinite. Official Action, at 3. Applicants have amended each of claims 1, 5, 7, 8, 12, 13, 16, 24, 26, 27, 31, and 35 to delete "such as."

Regarding claim 7, the Office asserts that the phrase "Bluetooth^{TM}," renders that claim indefinite. Official Action, at 3. Applicants have amended claim 7 to delete "Bluetooth^{TM}."

Regarding claims 11 and 30, the Office asserts that the phrase "instead of," renders that claims indefinite. Official Action, at 3. Applicants have amended claims 11 and 13 to delete "instead of."

Regarding claim 13, the Office asserts that the phrase "if available," renders that claim indefinite. Official Action, at 3. Applicants have amended claim 13 to delete "if available."

Regarding claim 20, the Office asserts that the word "optionally," renders that claim indefinite. Official Action, at 3. Applicants have amended claim 20 to delete "optionally."

Applicants submit that these claim amendments overcome the rejections under 35 USC § 112, second paragraph.

Further regarding claim 1, the Office has raised an issue regarding 35 USC § 112, sixth paragraph. The Office states:

> Applicant asserts that the claim elements "map storage" (claim 1, line 2), "means" (claim I), "locating" (claim 1, line 4), "emitting" (claim 1, line 8), and "computer program code" at least are means (or step) plus function limitation that invokes 35 U.S.C. 112, sixth paragraph. However, it is unclear whether the claim element is a means (or step) plus function limitation that invokes 35 U.S.C. 112, sixth paragraph. If applicant wishes to have the claim limitation treated under 35 U.S.C. 112, sixth paragraph, applicant is required to:...

Official Action, at 3. The present response to an Official Action is the first communication for this application in which the applicants have made remarks, so applicants believe that they have not previously asserted that claim 1 invokes 35 USC § 112, sixth paragraph. Given that, applicants will interpret the Office's remarks as meaning, "It appears that the applicants are

attempting to invoke 35 USC § 112, sixth paragraph. If applicants do wish to invoke 35 USC §
112, sixth paragraph, applicants are required to…" If this interpretation is incorrect, applicants
would appreciate clarification from the Office. Applicants have amended claim 1 and various
dependent claims to remove recitations of "means to."

Non-Obviousness of the Claimed Invention

Applicants will present non-obviousness arguments in the framework outlined in the
MPEP, i.e., applicants will describe the claimed invention, the art cited in the Official Action,
differences between the claimed invention and the cited art, and why the claimed subject matter
is not obvious over the cited art.

I. Applicant's Disclosure and Claimed Invention

The present invention relates to a robot system including at least one mobile robot that is
able to treat a surface, and while navigating the surface, creating a map of detected obstacles.
Furthermore, a mobile robot of the robot system may return to places on the map where obstacles
have previously been detected, and if the obstacle is no longer present, treat that previously un-
treated portion of the surface.

As set forth in paragraphs [0006]-[0007] of the instant specification, known techniques
for treating a surface with a robot are disadvantaged. These known techniques are disadvantaged
because, when a robot that uses known techniques encounters an obstacle that has not been
programmed into its computer, and which blocks the robot's path, the robot is interrupted in
treating a surface until that obstacle is removed. Applicants' invention is intended to eliminate
these delays where a robot performs no surface treatment work, while still ultimately treating the
entire surface. In doing so, the time the robot takes to treat a surface may be reduced.

Accordingly, as set forth in paragraph [0020] of the instant specification, a goal of
applicants' invention is to provide techniques for such a mobile robot to *return to an area in
which an obstacle was detected after a pre-determined time to check whether the obstacle is
still present and whether it is therefore still hindered from performing surface treatment in
that area.* If the obstacle has been removed the mobile robot consequently completes the surface
treatment work. If the obstacle is still present the, or each, mobile robot is optionally

programmed to return to the same site one or more times to check whether the area is still

obstructed. Alternatively the information concerning the obstacle is stored or communicated to a

remote user, control system, computer or computer network.

　　　　Claim 1 recites a system as described above for treating a surface:

> 1.　　A robot system including at least one mobile robot, for
> treating a surface, comprising:
>
> map storage logic to store a map of the surface to be treated;
>
> a navigator to navigate the mobile robot to at least one point on a
> surface; and
>
> wherein *the mobile robot is configured to:*
>
> 　　identify its position of the mobile robot with respect to the
> surface to be treated;
>
> 　　automatically deviate the mobile robot away from its initial
> path in the event that an obstacle is detected along its path;
>
> 　　store and/or communicate data concerning the surface
> treatment performed and any obstacles detected by the sensor;
>
> 　　produce emissions, the emissions comprising symbols,
> lines, shapes, or written characters in one or more colours for
> treating at least one point on a surface; and
>
> 　　　*return to an area in which an obstacle was detected after*
> *a pre-determined time to check whether the obstacle is still*
> *present and whether the mobile robot or another mobile is still*
> *hindered from performing surface treatment in that area.*

　　(Claim 1, emphasis added). Independent claims 12 and 17 make similar recitations as

those found in claim 1.

　　II. The Prior Art

　　　　Ruffner discloses a robot that may map a work area and perform one or more tasks over

that work area, such as mowing, vacuuming, scrubbing, waxing, and polishing. Ruffner's robot

can detect and avoid obstacles. Ruffner does not contemplate a scenario in which objects may be

removed, such that the task may then be performed in the area where the object used to be

located. This observation appears to be consistent with the Office's view of Ruffner, since the

Office Action states that Ruffner does not disclose that its Robot is programmed to return to an

area in which an obstacle was detected after a pre-determined time to check whether the obstacle

is still present and whether it is therefore still hindered from performing surface treatment in that area. Official Action, at 7.

Hyunh discloses a robot system for emitting different symbols, lines, shapes, and characters.

Trovato discloses techniques for planning a route through an area for a robot to traverse that area. Specifically, Trovato discloses techniques for efficiently planning a new route for a given area when that area has changed somehow – e.g. an obstacle has been added to or removed from the area. To wit, Trovato at col. 1, lines 34-39 teaches:

> After budding, some aspect of the configuration
> space may change, for instance, if an obstacle is re- 35
> moved or a goal added. In such a case, it may be ineffi-
> cient to bud the entire configuration space again be-
> cause only a small part of the configuration space may
> be affected.

In Trovato, the robot is provided with information about objects that have been removed, so the robot does not need to return to an area to determine whether an object in that area has been removed:

> 25   In box 100, a configuration space, filled with direc-
>   tion arrows and costs....to_goal, is assumed. Informa-
>   tion about changed goal and obstacle states is also as-
>   sumed to be provided. These states are already trans-

Trovato, at col. 2, lines 25-28. Furthermore, the task that Trovato's robot conducts upon being provided information about objects that have been removed is to plan a new route through the area. Trovato, at col. 2, lines 22-24. Trovato's robot does not need to go to the area of a removed object to plan a new route, and Trovato does not teach that its robot does go to the area of a removed object to plan a new route. In fact, Trovato's robot may calculate a new route that avoids the area of a removed object entirely, so that the robot never goes to the area of a removed object.

III. Non-Obviousness of the Claimed Invention

Applicants will now address the rejections of various claims under Section 103. These rejections include the following rejections based on different combinations of references:

- Claims 1-3, 5-10, 12, 13, 17, 19, 20, and 24-29 stand rejected under 35 USC § 103(a) as being unpatentable over Ruffner (Pub. No. 2002/0156556) in view of Huynh, et al. (Pat. No. 5,529,432).

- Claims 4, 14, 15, 23, 33, and 34 stand rejected under 35 USC § 103(a) as being unpatentable in view of Ruffner and Huynh and further in view of Trovato et al. (Pat. No. 5,083,256).

- Claims 11 and 30 stand rejected under 35 USC § 103(a) as being unpatentable in view of Ruffner and Huynh and further in view of Bottomley et al. (Pat. No, 6,941,199).

- Claims 16 and 35 stand rejected under 35 USC § 103(a) as being unpatentable in view of Ruffner, Huynh, and Trovato, and further in view of Aman et al. (Pub. No. 2002/0030742).

- Claim 31 stands rejected under 35 USC § 103(a) as being unpatentable in view of Ruffner and Huynh and further in view of McMurtry et al. (Pub. No. 2005/0055142).

- Claims 32, 36, and 37 stand rejected under 35 USC § 103(a) as being unpatentable in view of Ruffner and Huynh and further in view of Verbeek (Pat. No. 6,039,056).

In the following subsections, applicants demonstrate that the cited art, taken individually, or in combination, fails to both anticipate and render obvious the claims, as amended.

Claims 1-3, 5-10, 12, 13, 17, 19, 20, and 24-29 stand rejected under 35 USC § 103(a) as being unpatentable over Ruffner (Pub. No. 2002/0156556) in view of Huynh, et al. (Pat. No. 5,529,432).

Applicants have amended claim 1 to recite,

> wherein the mobile robot is configured to…return to an area in
> which an obstacle was detected after a pre-determined time to
> check whether the obstacle is still present and whether the mobile

        robot or another mobile is still hindered from performing surface
        treatment in that area.

Support for this amendment is found in at least original claim 4 of the instant application. The Office has previously rejected similar language of this claim 1 as it appeared in claim 4, for being unpatentable over Ruffner and Huynh and further in view of Trovato. Applicants respectfully submit that this combination of references fails to render obvious the invention described in claim 1, as amended.

The Office cites to Trovato at FIG. 1, and col. 5, line 27 – col. 6, line 39 as disclosing a system for navigating a robot to return to an area with obstacle detected previously and determining if the obstacle has been removed, and if so, performing a task in the area by efficiently locating the area. Official Action, at 8. Applicants respectfully disagree with the Office's reading of Trovato.

Trovato does not teach that the mobile robot is configured to…return to an area in which an obstacle was detected after a pre-determined time to check whether the obstacle is still present, because Trovato provides that information to a robot without the robot returning there: "Information about changed goal and obstacle states is also **assumed to be provided**," Trovato at col. 2, lines 26-28 (emphasis added). Trovato not only does not disclose that the mobile robot is configured to return to an area in which an obstacle was detected after a pre-determined time to check whether the obstacle is still present, but also teaches away from that because Trovato provides this alternative way for a robot to obtain information about whether the obstacle is still present.

Furthermore, none of Ruffner, Hyunh, or Trovato, taken individually or in combination, recognizes the problem of treating a surface when a mobile robot's path is temporarily or permanently blocked that the present invention solves. The Office recognizes that neither Ruffner nor Hyunh recognizes this problem. Official Action, at 7. Trovato also fails to recognize this problem, and modifying Trovato in the manner set forth by the Office would render Trovato unsatisfactory for its intended purpose. The stated purpose of Trovato is to plan an optimal path for a robot (in this environment where it has been provided with information

about a removed obstacle) that efficiently navigates the robot through an area.[1] A robot travelling in an optimal path is not returning to an area in which an obstacle was detected after a pre-determined time to check whether the obstacle is still present.

The differences between the paths of Trovato and the present invention further highlights how modifying Trovato in the manner set forth by the Office would render Trovato unsatisfactory for its intended purpose. Trovato's path is determined in an environment that does not change once Trovato's robot begins its journey along that path, and in which an obstacle does not block that path. That is, while Trovato's environment may change between journeys (such as by adding or removing obstacles that affect the path chosen), once a path is selected, a robot following that path will not encounter an obstacle. In contrast, the present invention specifically considers situations in an environment that may change after the mobile robot begins its journey, and in which an obstacle may block a mobile robot's desired path. The mobile robot of the present invention may not follow its path in a linear fashion, as does Trovato's robot, but where it encounters an obstacle, it deviates from the path (deviating from the path being something that Trovato's robot does not do), resulting in the mobile robot skipping a portion of the path. Later, the mobile robot of the present invention will return to the skipped portion of the path to again attempt to traverse that portion of the path (something that it may do where a prior obstacle has been removed).

For at least these reasons, applicants respectfully submit that neither Ruffner in view of Huynh nor Ruffner and Huynh in view of Trovato renders obvious the invention described claim 1, as amended, nor does either of those combinations of references render obvious the dependent the invention described in claims 2-3, 5-11, or 23-32. Independent claims 12 and 17 have been amended to make similar recitations as claim 1. For similar reasons expressed with respect to claim 1, applicants respectfully submit that neither Ruffner in view of Huynh nor Ruffner and Huynh in view of Trovato renders obvious the invention described in claims 12 or 17, nor does

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[1] *See e.g.*, Trovato at col. 1, lines 21-24: "The **path planning** problem, as applied to robots, typically involves getting a robot **from a start point to a goal point** while avoiding obstacles," and Trovato at col. 2, lines 22-24: "The resulting configuration space provides information necessary to generate a series of set points to be followed for **an optimal path**," (emphasis added).

either of those combinations of references render obvious the invention described in respective dependent claims 13, 15-16, 33-36, and 38, and 19-20, and 39.

Claims 4, 14, 15, 23, 33, and 34 stand rejected under 35 USC § 103(a) as being unpatentable in view of Ruffner and Huynh and further in view of Trovato et al. (Pat. No. 5,083,256). Applicants respectfully submit that Ruffner and Huynh and further in view of Trovato fails to render obvious claims the invention described in 4, 14, 15, 23, 33, and 34 for at least the reasons that it fails to render obvious parent the invention described in claims 1 and 12.

Claims 11 and 30 stand rejected under 35 USC § 103(a) as being unpatentable in view of Ruffner and Huynh and further in view of Bottomley et al. (Pat. No, 6,941,199). Applicants respectfully submit that Bottomley fails to cure the deficiencies of Ruffner in view of Huynh as applied to parent claim 1, so that Ruffner and Huynh and further in view of Bottomley fails to render obvious claims the invention described in 11 or 30.

Claims 16 and 35 stand rejected under 35 USC § 103(a) as being unpatentable in view of Ruffner, Huynh, and Trovato, and further in view of Aman et al. (Pub. No. 2002/0030742). Applicants respectfully submit that Aman fails to cure the deficiencies of Ruffner in view of Huynh as applied to parent claim 12, so that Ruffner and Huynh and further in view of Aman fails to render obvious claims the invention described in 16 or 35.

Claim 31 stands rejected under 35 USC § 103(a) as being unpatentable in view of Ruffner and Huynh and further in view of McMurtry et al. (Pub. No. 2005/0055142). Applicants respectfully submit that McMurtry fails to cure the deficiencies of Ruffner in view of Huynh as applied to parent claim 1, so that Ruffner and Huynh and further in view of McMurtry fails to render obvious the invention described in claim 30.

Claims 32, 36, and 37 stand rejected under 35 USC § 103(a) as being unpatentable in view of Ruffner and Huynh and further in view of Verbeek (Pat. No. 6,039,056). Applicants respectfully submit that Verbeek fails to cure the deficiencies of Ruffner in view of Huynh as applied to parent claims 1 and 12, so that Ruffner and Huynh and further in view of Verbeek fails to render obvious the invention described in claims 32, 36, or 37.

New Claims

Claims 38 – 56 are new. Support for these claims is found in the instant application in at least the original claims and paragraphs [0009]-[0013], [0016]-[0017], and [0020]-[0023].

CONCLUSION

The Commissioner is hereby authorized to charge any fee deficiency, charge any additional fees, or credit any overpayment of fees, associated with this application in connection with this filing, or any future filing, submitted to the U.S. Patent and Trademark Office during the pendency of this application, to Deposit Account No. 23-3050.

Respectfully submitted,

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